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Patents
Entomology

To: .Art Palmer

Date: August 12, 1983

From: .D. Faustini and S. Tafur

Subject: .Patent Disclosure Supplement for D-114-Cigarette Beetle Control

Additional work in the study of cigarette beetle pupal cell (PC) casing has continued. A previous memo[1] described the bioassay method developed to facilitate this study. In a subsequent experiment[2,3] the effect of lower doses of PC casing methanol extract has been investigated in an attempt to determine if a dose-response can be established. The extract has also been tested against another common stored product insect, the red flour beetle (Tribolium castaneum), to determine if the toxicity extends to other insects. This insect is considered to be the "white rat" of beetles and is cosmopolitan in distribution.

The results obtained in this experiment are summarized in Table I. Larvacidal activity is expressed as mortality and represents twenty individual tests per sample. The red flour beetle was tested (40 replicates) at a single dose (0.5 mg/vial) known from the previous experiment to be toxic to the cigarette beetle.

Table I: SUMMARY OF SAMPLE DESCRIPTIONS AND LARVACIDAL ACTIVITIES

SAMPLE CODE	SAMPLE DESCRIPTION	INSECT[a]	MORTALITY[b]
I	PC MeOH Extract (0.10 mg/vial)	CB	15/20
II	Control	CB	4/20
III	Control	FB	0/20
IV	PC MeOH Extract (0.25 mg/vial)	CB	19/20
V	PC MeOH Extract (0.50 mg/vial)	FB	25/40
VI	PC MeOH Extract (0.025 mg/vial)	CB	18/20

a) CB = cigarette beetle
FB = flour beetle

b) number of dead larvae/total number of larvae tested (results scored after six days).

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The PC casing methanol extract exhibited high toxicity to the cigarette beetle at all of the doses (samples I, IV and VI). These data were obtained after six days while the mortality rate of the controls (Sample II) was still low. Since a non-toxic dose has not been reached, a dose-response can not be established.

The extract also demonstrated toxicity to the red flour beetle although 100% mortality did not occur (Sample V). This may be explained by the fact that the Tribolium larvae that were selected for this test were of 12 possible instars. Each instar undergoes various degrees of food consumption with older larvae being less likely to feed since they are in preparation for pupariation (i.e., formation of pupa). Some of the larvae developed into pupae shortly after the test began as a defensive response to the adverse conditions. These larvae could no longer consume toxic material and could not be scored as dead. The younger larvae affected by the toxic material were characterized by cessation of movement, cuticular darkening, muscular tetany of pro-, meso- and metathoracic legs, followed by subsequent death. Control larvae appeared quite vigorous and active throughout the experimental period (Sample III).

Further studies are planned.

DF/ST/mps

References

1. Tafur, S.; Faustini, D.; Charles, J. Patent disclosure supplement for D-114-Cigarette beetle control. Memo to A. Palmer. 1983 August 1.

2. Tafur, S. P.M. Notebook No. 7778, pp. 123-124.

3. Faustini, D. P.M. Notebook No. 7746, pp. 105-110.

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